



KATWA COLLEGE

(Affiliated to the University of Burdwan)

P.O.: Katwa, Dist.: Purba Bardhaman, West Bengal, 713 130, India

Ref: 22/Equipments & Books/KC/PC/18

Date- 24/12/2018

QUOTATIONS NOTICE FOR EQUIPMENTS PURCHASE FOR BOTANY, CHEMISTRY, GEOGRAPHY AND PHYSICS (MODIFIED AND NEW ADDED ACCORDING TO : 22/Equipments & Books/KC/PC/18 DATED 14/12/2018 AND **NEW BOOKS PURCHASE** FOR DIFFERENT DEPARTMENTS IN RESPECT OF ADVERTISEMENT NO ----- IN THE DAILY NEWS PAPER THE TELEGRAPH, PAGE NO- METRO- 13, DATED – 14/12/2018

Sealed Quotations are invited from recognized Manufacturers/Suppliers/Contractors for procuring following items within **09/01/2019** (on working days, upto 3.00 p.m.). In no case the Quotations papers will be accepted after the date and time mentioned above. Quantity of the specific items may change according to final consideration. Quotation of different price ranges may be submitted for an item where specification / Model no. is not mentioned. **Quotations must include GST registration no., inclusive GST rate, exclusive GST rate and status of delivery/installation charges etc along with terms and conditions of available Guarantee/Warranty.** Quotations papers should be separately submitted for specific envelop as mentioned hereunder. No softcopy is entertained/ accepted. Sealed Quotations to be sent in the College Address – Principal, Katwa College, Katwa, Purba Burdwan, 713130 within 09/01/2019 on working days, upto 3.00 p.m.). **Before submit the quotations of Books you must ensure that at least 95% of order books must be supplied. Books List are available in the Central Library -Libraqrian and Bursar, Katwa College.**

LIST OF EQUIPMENTS

Department of Botany

Slides

messengered xylem elements, permanent tissue, phloem, stem- Heliantus (primary, secondary), root- Zea mays, Heliantus. leaf – Grass, Bamboo, Mango, Ecological Adaptation- hydrilla stem slide, Diff. type Ovule slides. female gametophyte- polygonum, pinus pollen, Shorea pollen.

Chemicals and glass goods

sucrose, 500gm, Agar, dextrose, nutrient agar,

petridish 30 pcs. watch glass 30, reagent bottle 12, black polythene paper 1 bundle, plastic beaker 1000ml-12 pcs. 500 ml plastic beaker -12 pcs. funnel 12 pcs, respiroscope 6 pcs, crystal violet, safranin, carbol fuchsin, xylol, rectified spirit, alcohol, glycerin,

soil thermometer 2 pcs, Max and Min thermometer, anemometer, hygrometer, rain gauge,

lux meter, pH meter, universal ind., pH paper, soil test kit, titration tube, dissolve oxygen sensor, bacterial loop

Instruments

Incubator, Conical flask, test tube with cap, measuring cylinder plastic

Instruments need to be repaired

1. Laminar air flow, 2. Autoclave, Incubator

Department of Chemistry

1. Lasany LI-294 Microprocessor UV-VIS Single Beam Spectrophotometer
2. LAMBDA 365 UV/Vis Spectrophotometer
3. UV-1800 Spectrophotometer from Shimadzu
4. Labline PH Meter, Dimension : 80 mm (H) x 235 mm (W) x 150 mm (L)

5. Labtronics Microprocessor Based PH / Temperature / MV Meter (Graphical),
Model No.: LT-50, Power : 230V + 50Hz
6. Labline digital conductometer
7. Labman Digital Conductivity Meter

Department of Geography

<i>Name of Instrument</i>	<i>Quantity</i>
Abney Level	2
Clinometer	2
Soil Auger for soil sample	5
GNSS (Global Navigation Satellite System)	2
Dolerite (big size)	1
Pegmatite (big size)	1
Quartzite (big size)	1
Magnetite (big size)	1
Galena (big size)	1
HCL Acid	1 bottle
Reagent container no 2	2 bottles

Department of Physics

Sl. No	Apparatus	Pcs
01.	<p>To determine Stefan's Constant. The total setup complete with the following</p> <p>a) Stefan's Radiation Constant Apparatus - Comprising a blackened hollow hemisphere about 25cm dia, fitted in a wooden board lined with tin, and a steam chamber above the hemisphere to measure them an uniform temperature by passing steam through it recorded by two thermometers- heavy silver disc soldered a bottom to copper -constantan thermocouple housed in Ebonite tube with lid engraved on ebonite tube are disc constants, mass and area, complete with one extra similar thermocouple for calibration is supplied.</p> <p>b) 2 Thermometer $\frac{1}{2}$ -</p> <p>c) Steam Boiler -2 liter capacity</p> <p>d) Spot Galvanometer - Coil Resistance -100 Sensitivity - 0.04 to 0.05 uA per scale div. -CDR - 1000 approx</p> <p>e) Rubber tube - 7mm</p>	2
02.	<p>To determine the Coefficient of Thermal Conductivity of Cu by Seale's Apparatus. The total setup complete with the following</p> <p>a) Searle's Apparatus for Thermal Conductivity of Copper - Comprising of a copper bar 25mm in diameter and 300mm in length fitted with a steam jacket heater at one ends to be supplied from a steam boiler, and a copper water cool spiral at the other end. The bar has tubes for inlet of water and for thermometers. Fitted in a superior quality wooden case. Packed with felt for thermal insulation and removable from the front showing the construction. Supplied without steam boiler and thermometer.</p> <p>b) Thermometers half degree.</p> <p>c) Thermometers $110^{\circ} \times 1/10$.</p> <p>d) Steam Boiler - 2liter Capacity</p> <p>e) Hot Plate - Round Type with energy regulator</p> <p>f) Stop Watch - Digital</p>	2
03.	<p>a) Platinum Resistance Thermometer flask - with long neck and side arm 1000ml capacity (Borosilicate glass) [Platinum Resistance Thermometer not required]</p> <p>b) heating Mantle with energy regulator - 1 liter capacity</p> <p>c) Silicon Rubber Tube - 8mm</p> <p>d) Aniline -</p>	2
04.	<p>a) Round bottom flask with side arm B-24 Joint for condenser -1 liter capacity</p> <p>b) Straight condenser 12inch with B-24 Joint</p> <p>c) Receiving Band</p> <p>d) Receiver (Conical flask-250ml)</p> <p>e) Iron Stand - Rods- Mild steel Rods, richly chrome plate locked pin for extra tightening, universal thread to fit any base. Size - Base - of mild</p>	4

	<p>steel self leveled no need for leveling feet drawn in sheet, Powder coated – superior quality</p> <p>f) three finger clamp –</p> <p>g) Boos head –</p>	
05.	<p>Apparatus to calibrate a thermocouple to measure temperature in a specified Range using (i) Null Method, (ii) Direct measurement using Op-Amp difference amplifier and to determine Neutral Temperature</p> <p>SCOPE OF LEARNING: Measurement of Thermo EMF across Two Junctions of a Thermocouple With Temp.</p> <p>TECHNICAL SPECIFICATIONS:</p> <p>Power Supplies:</p> <ul style="list-style-type: none"> • DC Supply IC Regulated +2/4V DC, 500mA. • Operated on Mains power 230V, 50Hz $\pm 10\%$ <p>Meters:</p> <ul style="list-style-type: none"> • Digital Voltmeter DC (Dual Range) • Digital Ammeter DC (Dual Range) • Digital Galvanometer As Null Detector <p>Components are mounted on the panels are:</p> <ul style="list-style-type: none"> • 2 Dial Decade Resistor Box on Board. <p>SALIENT FEATURES:</p> <ul style="list-style-type: none"> • Front panel built with high class insulated Printed Circuit Board sheet with well printed circuits and symbols. • Instruction manual. • Connections are brought out through 4mm Colored Sockets. • Patch Cords 4mm. • The trainer is housed in ABS Plastic cabinet. • Size of the trainer set 12"x10" <p>ACCESSORIES WITH TRAINER:</p> <ul style="list-style-type: none"> • 10 Wire Potentiometer • Electrical Kettle • Constantan Thermocouple • Glass Beaker • Thermometer 	2
06.	<p>To determine the pressure coefficient of air by constant volume method</p> <p>Determination of the pressure Co-efficient of air at constant volume by Jolly's Apparatus:</p> <p>The total set up is complete with the following –</p> <p>a) Constant Volume Air Thermometer (Charle's Law Apparatus) - Metal base with stand, constant volume glass blub (Jolly's bulb) can be raised or lowered along wooden stand one brass slider holding mercury reservoir slides vertically along aluminum rod complete with rubber tube and glass parts.</p> <p>b) Thermometer – 1/10 degree –</p> <p>c) Beaker -500ml – Borosil Glass</p> <p>d) Bunsen Barner – with stop cock</p> <p>e) Thermometer Stand with Holder:</p>	1
07.	Mercury	2 Kg
08.	Determination of coefficient of linear expansion of a material by travelling	3

	<p>microscope – Complete with the following –</p> <p>a) Linear Expansion Apparatus :Two one meter long concentric pipes fitted horizontally on a wooden base outer pipe is covered with asbestos rope & has arrangement for thermometer holes and also steam inlet & outlet supplied with 110 cms. long aluminum & Brass Rod of ¼” dia. with scratch mark for focusing by traveling microscope.</p> <p>b) Thermometer – 1/10 degree</p> <p>c) Travelling Microscope – Travelling microscope T-shaped Model with horizontal and vertical scales. The bed is of cast iron and accurately machined. The horizontal carriage is machined and interground on the guideways of horizontal bed. The carriage is fitted with vertical brass pillar carrying a microscope tube on a ground scale is 18 cms. And vertical 16 cms. Long. Both the horizontal scale and vertical traverse. Microscope tube is provided with rack and pinion. A milky white Perspex platform is provided on the horizontal bed. Vernier constant 0.001 cms. Complete in well polished wooden case. Having stainless steel scales.</p> <p>d) Meter’s Scale – Wooden 1meter long.</p> <p>e) Boiler – 2lit – with level indicator</p> <p>f) Rubber tube – 8mm</p>	
09.	<p>To determine the frequency of an electric tuning fork by Melde’s experiment and verify λ^2-T law. The total set up is complete with the following-</p> <p>a) Melde’s Apparatus – This massive and powerful fork which has a frequency of approximately 60 vibrations per sec., is ideal for producing standing waves and is mounted on a heavy cast iron base. An electromagnet is arranged between the prongs of the fork without touching it. A small spring type strip is attached to the one of the prongs. A screw just makes a contact with this strip. Supplied with scale pan, bench clamp with pulley with weights.</p> <p>b) Battery Eliminator – 3Amp</p> <p>c) Physical weight Box – 200gm</p> <p>d) Measuring tape -</p>	3
10.	<p>Digital IC Trainer – DIGITAL IC TRAINER is a product which provides facilities The experiments are designed to each student’s fundamental concepts and at the same time introducing them practical application that will enable them to design new circuits and independently implement the same. Digital IC Trainers provide hands on practical experience on digital electronics at one place and save the time and money without compromising the standard. This Digital IC Trainers is designed to educate the students in understanding, design evaluate, test and modify the digital circuits in an easy manner. Digital IC trainer, it consists of specially designed brass sockets of 2 mm inner diameter which are press fit by special techniques on Bakelite panel. Specially designed patch cords of pin diameter 2 mm are provided so that the students can make interconnections themselves and verify the truth table as mentioned in User’s Manual. Various experiments on logic gates, Flip- Flop & Counters can be done. Specification: Input</p> <ul style="list-style-type: none"> • 16 Logic input toggle switches. • One push button for Mono pulse. <p>Output</p>	2

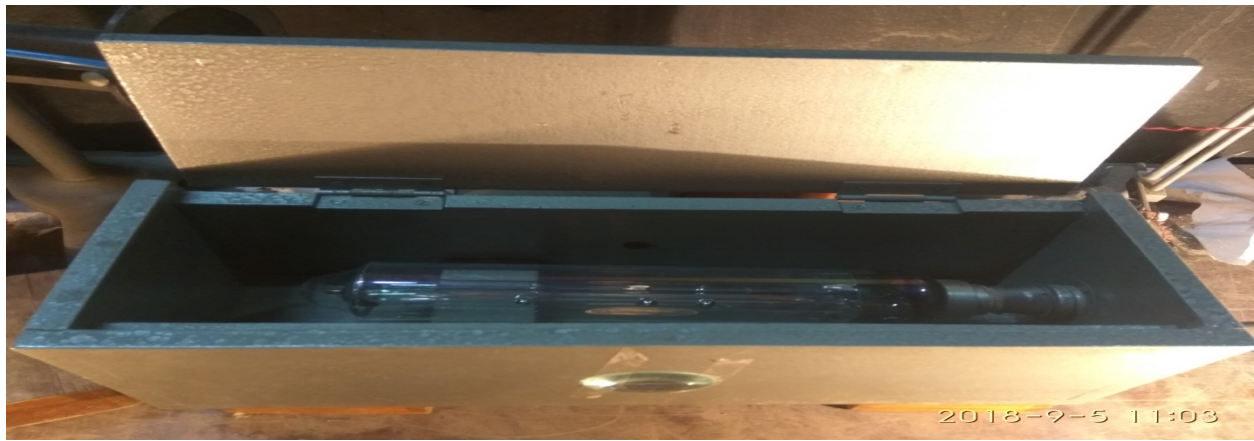
	<ul style="list-style-type: none"> • 16 Logic output indicators LED display. • 7 Segment Display • 2 - Internal driver driven • 1 - External driver driven • Microcontroller based TTL Clock generation of • DC Power Supply Tapings <p>Board consists of following:</p> <ul style="list-style-type: none"> • DC Regulated Power Supply 5 V/1 Amps. • 2mm Interconnection Leads • Special IC Base of 16 Pin for inserting any IC of 16 Pins • Clock Generator • Special IC Base of 14 pin for inserting any IC of 14 pins • Comprehensive User's Manual for doing experiments on logic Gates, Flip-Flops & Decade Counter is provided. • Logic Input Switches (Bounce less) • 7 segment Display with Decoder IC • LED Indicators (Buffered) • Bread Board attachment. 	
11.	IC-555 timer	6
12.	IC (7400, 7402, 7432, 7408, 7486, 7476, 741, 351)	6 Pcs each
13.	Bread board	12
14.	<p><i>Measurement of Planck's constant using black body radiation and photo-detector.</i></p> <p>SCOPE OF LEARNING: Study of Photo Electric Effect</p> <p>TECHNICAL SPECIFICATIONS: <u>Power Supplies:</u></p> <ul style="list-style-type: none"> • DC Supply 0-5V DC, 150mA (With Negative and Positive Polarity) • Operated on Mains power 230V, 50Hz \pm10% <p><u>Digital Meters:</u></p> <ul style="list-style-type: none"> • Ammeter 20uA DC. • Voltmeter 20V DC. <p><u>Components are mounted on the panels are:</u></p> <ul style="list-style-type: none"> • Zero Setting through 10 Turn Potentiometer. • Voltage Control through Potentiometer. • Stand to hold Photo Cell enclosed in metal box. • Light Source is housed in suitable box with Intensity Control. • Color Filters: Red, Yellow, Green, Blue and Violet. • Stand to hold color filter. • BNC to BNC lead for interconnection. <p>SALIENT FEATURES:</p> <ul style="list-style-type: none"> • Front panel built with high class insulated Printed Circuit Board sheet with well printed circuits and symbols. • Instruction manual. • Connections are brought out through 4mm Colored Sockets. • Patch Cords 4mm. • The trainer is housed in ABS Plastic cabinet. <p>OPTIONAL ACCESSORIES:</p> <ul style="list-style-type: none"> • Digital Multimeter • Optical Bench 	3

15.	<p><i>Photo-electric effect – Photo current versus intensity and wavelength of light, maximum energy of photo-electrons versus frequency of light.</i></p> <p>SCOPE OF LEARNING: Study of Photo Electric Effect</p> <p>TECHNICAL SPECIFICATIONS:</p> <p><u>Power Supplies:</u></p> <ul style="list-style-type: none"> • DC Supply 0-5V DC, 150mA (With Negative and Positive Polarity) • Operated on Mains power 230V, 50Hz \pm10% <p><u>Digital Meters:</u></p> <ul style="list-style-type: none"> • Ammeter 20uA DC. • Voltmeter 20V DC. • Lux Meter <p><u>Components are mounted on the panels are:</u></p> <ul style="list-style-type: none"> • Zero Setting through 10 Turn Potentiometer. • Voltage Control through Potentiometer. • Stand to hold Photo Cell enclosed in metal box. • Light Source is housed in suitable box with Intensity Control. • Color Filters: Red, Yellow, Green, Blue and Violet. • Stand to hold color filter. • BNC to BNC lead for interconnection. <p>SALIENT FEATURES:</p> <ul style="list-style-type: none"> • Front panel built with high class insulated Printed Circuit Board sheet with well printed circuits and symbols. • Instruction manual. • Connections are brought out through 4mm Colored Sockets. • Patch Cords 4mm. • The trainer is housed in ABS Plastic cabinet. 	3
16.	<p><i>To determine work function of material of filament of directly heated vacuum diode.</i></p> <p>Work Function of Diode valve – Complete with IC regulated power supply, 250V/15mA & 6.3V/0.5amp four meters and circuit diagram printed on panel. Used to verify Richardson’s Equation.</p>	3
17.	<p><i>To determine the Planck’s constant using LEDs of at least 4 different colours.</i></p> <p>The set-up is one Planck’s Constant Apparatus – Inbuilt One digital voltmeter, one digital mA meter, Output terminal, One Various wave length LED complete with box inbuilt – Blue, Green, Yellow, Red, White, LED with input terminal.</p>	2
18.	<p><i>To determine the absorption lines in the rotational spectrum of Iodine vapour.</i></p> <p>a) Iodine Tube with stand, Lamp house & power Supply – b) Spectrometer – Scale : The 177 mm diameter circle is fixed and both the telescope and table are fitted with independent double ended verniers reading to 30 seconds of</p>	2

	<p>arc and have independent fine and coarse movements. While coarse adjustment is done by releasing the clamping screw and moving by hand, fine adjustment is made by engaging the clamping screw and moving the tangent screw. Collimator: Mounted on a fixed pillar. At one end is fitted 32mm dia clear aperture, 175mm focus achromatic objective and at the other end a 6mm long unilaterally adjustable slit. Telescope: Mounted on a movable pillar. At one end is fitted 32mm dia clear aperture 175mm focus achromatic objective and at the other end a 15X Ramsden eyepiece and a glass crossline graticule. Both telescope and collimator have rack and pinion systems for focusing the objectives and means for leveling their optical axes and squaring them to the axis of rotation. Prism Table: The 85mm diameter table is marked with lines to assist positioning of the prism with respect to leveling screws and has interchangeable clamping units for the prism and diffraction grating. Standard Accessories: 1 Dense flint glass prism, 1 Prism clamp, 1 Diffraction grating holder, 1 Magnifier glass, 1 Tommy bar for adjustment of optical axes, 1 Dust cove, 1 Wooden case.</p> <p>c) Grating -15000LPI – d) Analog Meter –</p>	
19.	<p><i>To show tunneling effect in tunnel diode using V-I characteristics</i></p> <p>Complete with In built DC regulated Power Supply of 5 volts. Two 3 ½ digit digital panel meter for measuring the voltage across resistance & tunnel diode (Range 0-2V DC).Current control on the front panel. Tunnel Diode, circuit diagram in front panel board, all 4mm connecting lids heavy base, manual & connecting lids etc.</p>	2
20.	<p><i>Apparatus for determination of wavelength of LASER light by single slit and double slit diffraction.</i></p> <p>The total setup complete with the following –</p> <p>a) He-Ne Laser Ideally suited for simple, clear & easily comprehensive assemblies for interference, diffraction and holography experiments. The laser is constructed in such a way that is safe to use under any circumstances. Laser tubes along with SMPS power supply are housed in thick powdered coated aluminum Box. From the hole, the laser beam comes out. Operation Wavelength : 632.8nm (RED) Beam Diameter : 0.8mm Beam Divergence : ≤ 1 mrad Polarisation : random (unpolarised) Mode : TEM₀₀ Output Power Stability: $\pm 2.5\%$ Power Input : 220V AC$\pm 10\%$, 50Hz Min. Operating Life time : 15000 Hrs Shelf Life : 10 Years Output Power – 2mW Red random polarization.</p> <p>b) Optical Bench for He-Ne Laser – 1½ meter long High quality precision bench suitable for more advanced work. This all Aluminum extruded from a hard aluminum alloy. This aluminum triangular optical bench is ideal for educational & general laboratory application. CAT NO – 1656(C)</p> <p>c) Mount for He-Ne Laser: This rectangular stand (all metallic) is suitable for all types of He-Ne Laser this upper black stand can be used on optical bench as well as on the heavy base. this stand is used to align the He-Ne Lasers with</p>	2

	<p>other Optical components. It lets you remove & replace laser system quickly with confidence that it will still be centered exactly when you want it. Supplied with heavy base. CAT NO – 1654</p> <p>d) Detector with Digital meter – This detector is used to record the contrast variation at the fringe pattern. Detector : special photo diode use for various laser experiments in detector output measurement unit we are providing digital voltmeter of three ranges 200mV,2V & 20V. CAT NO – 1672</p> <p>e) Single Slit with micrometer – Brass Make f) Double Slit with micrometer – Brass Make g) Screen</p>	
21.	<p>Study of V-I & power curves of solar cells, and find maximum power point & efficiency.</p> <p>SCOPE OF LEARNING:</p> <ul style="list-style-type: none"> • Study of V-I Characteristics of Solar Cell <p>TECHNICAL SPECIFICATIONS:</p> <p><u>Analog Meters:</u></p> <ul style="list-style-type: none"> • Volt meter 10V DC. • Ammeter 200mA DC. <p><u>Power Supplies:</u></p> <ul style="list-style-type: none"> • Operated on Mains power 230V, 50Hz \pm10% <p><u>Components are mounted on the panels are:</u></p> <ul style="list-style-type: none"> • Solar Cell Unit (Mounted on Stand) • Light Source (100W Bulb) Table Lamp • Load Control through Potentiometer. <p>SALIENT FEATURES:</p> <ul style="list-style-type: none"> • Front panel built with high class insulated Printed Circuit Board sheet with well printed circuits and symbols. • Fuse for Short Circuit protection • Instruction manual. • Connections are brought out through 4mm Colored Sockets. • Patch Cords 4mm. • The trainer is housed in ABS Plastic cabinet. • Size of the trainer set 12"x8" 	3
22.	To study the various biasing configurations of BJT for normal class A operation	2
23.	<p>To design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias.</p> <p>R-C Coupled Amplifier CE Trainer Complete with heavy metal base inbuilt function generator, input & output BNC probe, with bread board attachment, heavy metal body, all 4mm connecting knob, with circuit diagram, manual & connecting knob, etc.</p>	2
24.	<p>To study the frequency response of voltage gain of a RC-coupled transistor amplifier.</p> <p>R-C Coupled Amplifier- Complete with heavy metal base inbuilt function generator, input & output BNC probe, with bread board attachment, heavy metal body, all 4mm</p>	1

	connecting knob, with circuit diagram, manual & connecting knob, etc.	
25.	To study a Wien bridge oscillator for given frequency using an op-amp. <i>Wein Bridge Oscillator:</i> <i>Complete with One Adjustable resistance knob ($K\Omega$), One selectable Capacitance knob (.01, .047, .1) & output CRO knob, circuit diagram in front panel board, all 4mm connecting lids heavy base, manual & connecting lids etc.</i>	1
26.	To design a digital to analog converter (DAC) of given specifications. Instrument Comprises of DC regulated Power Supplies 5 VDC/150mA, 0-10 VDC/150mA, +15 VDC/150mA, 1 Voltmeter, 4 SPDT switches provided for selecting logic '1' logic '0', one output indicator, circuit diagram printed on the front panel. connections of various inputs and outputs are brought out at sockets.	1
27.	To study the analog to digital convertor (ADC) IC. Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 0-10 VDC/150mA, +15VDC/150mA, 1 Voltmeter, 4 SPDT switches provided for selecting logic '1' logic '0', one output indicator, Circuit diagram Printed on the front panel. Connections of various inputs and output and outputs are brought out at sockets.	1
28.	To determine Young's Modulus of a Wire by Optical Lever Method The total setup complete with the following a) Young modulus wire by Optical Lever method – Stand type with 250gm x5 slotted weight. b) Reading Telescope –highly improved apparatus mounted on a 1" dia. Pillar of 18" length fitted on a heavy cast iron circular base with three leveling screws. With the help of a special arrangement applied to the carriage, the telescope can be rotated in a horizontal as well as in vertical plane. The telescope is fitted with achromatic objective and is focused by rack and pinion arrangement. It has a focal range from 3 feet to infinity. Complete with Perspex scale and holder. Both brass tubes	1
29.	Apparatus to investigate the motion of coupled oscillators The total set up is complete with the following – a) Coupled oscillators with stand b) Digital stop watch	1
30	Sodium vapour lamp arrangement for Newton's ring Experiment see the Photo below	3



Sl. No	Apparatus	Pcs
31	Apparatus to study of Electron spin resonance- determine magnetic field as a function of the resonance frequency	2
32	Apparatus to study of Zeeman effect: with external magnetic field.	1
33	tunnel diode	12
34	Apparatus for measurement of susceptibility of paramagnetic solution (Quinck's Tube Method)	2
35	Apparatus to measure the Magnetic susceptibility of Solids (Guoy method).	2
36	Apparatus to determine the Coupling Coefficient of a Piezoelectric crystal.	2
38	Apparatus to measure the Dielectric Constant of a dielectric Materials with frequency	
39	Apparatus to determine the band gap using a thermistor.	2
40	Apparatus to determine the refractive index of a dielectric layer using SPR	2
41	Apparatus to study the PE Hysteresis loop of a Ferroelectric Crystal.	2
42	Apparatus to measure the resistivity of a semiconductor (Ge) with temperature by	2

	four-probe method (room temperature to 150 oC) and to determine its band gap	
43	Apparatus to determine the Hall coefficient of a semiconductor sample.	2
44	Apparatus for verification of Malus law for plane polarized light.	2
45	Polarimeter	2
46	Apparatus to analyze elliptically polarized Light by using a Babinet's compensator.	2
47	Apparatus to determine the wavelength and velocity of ultrasonic waves in a liquid (Kerosene Oil, Xylene, etc.) by studying the diffraction through ultrasonic grating.	2
48	Apparatus to study the reflection, refraction of microwaves	2
49	Apparatus to determine the refractive index of liquid by total internal reflection using Wollaston's air-film.	2
50	Apparatus to determine the refractive Index of (1) glass and (2) a liquid by total internal reflection using a Gaussian eyepiece.	2
51	Apparatus to study the polarization of light by reflection and determine the polarizing angle for air-glass interface.	2
52	Dual trace CRO (scientific)	2
53	Apparatus to study envelope detector for demodulation of AM signal	10
54	Apparatus to study FM - Generator and Detector circuit	2
55	Apparatus to study AM Transmitter and Receiver	2
56	Apparatus to study Time Division Multiplexing (TDM)	2
57	Apparatus to study Pulse Amplitude Modulation (PAM)	2
58	Apparatus to study Pulse Width Modulation (PWM)	2
59	Apparatus to study Pulse Position Modulation (PPM)	2
60	Apparatus to study ASK, PSK and FSK modulators	2
61	Multimeter (Metravi 19 Digital)	2
62	Computer	4

***Sd/-
Principal,
Katwa College***